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An adapter, particularly intended for an electrical contact rail.

Abstract:

Abstract of EP0159556

The invention relates to an adapter (10) for cooperation with a substantially C-shaped contact rail, collector rail, wiring channel or like device (126) having flange-like portions facing towards a longitudinally extending opening, these flange-like portions carrying on their inner surfaces electrical conductors (158, 159, 160). The adapter includes an elongated insertion part (22) and a contact and locking beam having electrical contact pins (42, 44) and being arranged to be swung between a position in which it lies in the insertion part for insertion of the adapter (10) into the contact rail (126) or removal of the adapter therefrom, and an extended position in which it is firmly secured against the flange-like parts of the contact rail. The contact beam is secured to a hollow shaft (52) which extends through a guide sleeve (84) on the adapter (10). The shaft (52) and the guide sleeve (84) include manoeuvering grooves (66) and guide grooves (88) respectively, for receiving a mounting tool (100), by means of which the adapter can be fitted to and removed from the contact rail (126). The connector includes a push-cover (20) for the guide sleeve (84), this cover activating a switch in a manner to break the supply of current when the opening of the guide sleeve (84) is accessible to the mounting tool (100). The adapter is provided on the front side (12) thereof with a signal lamp (18), which lights-up when the adapter (10) is connected to a current-carrying conductor.

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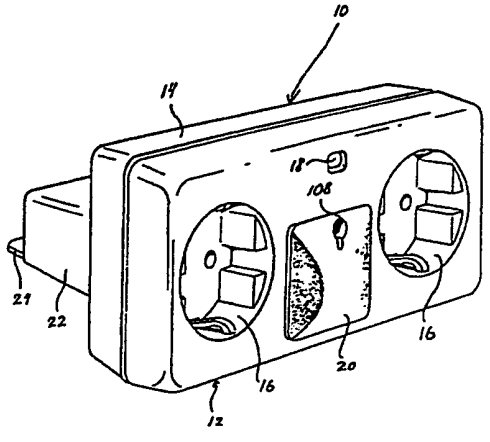
(54) An adapter, particularly intended for an electrical contact rail.

(57) The invention relates to an adapter (10) for cooperation with a substantially C-shaped contact rail, collector rail, wiring channel or like device (126) having flange-like portions facing towards a longitudinally extending opening, these flange-like portions carrying on their inner surfaces electrical conductors (158, 159, 160). The adapter includes an elongated insertion part (22) and a contact and locking beam having electrical contact pins (42, 44) and being arranged to be swung between a position in which it lies in the insertion part for insertion of the adapter (10) into the contact rail (126) or removal of the adapter therefrom, and an extended position in which it is firmly secured against the flange-like parts of the contact rail. The contact beam is secured to a hollow shaft (52) which extends through a guide sleeve (84) on the adapter (10). The shaft (52) and the guide sleeve (84) include manoeuvering grooves (66) and guide grooves (88) respectively, for receiving a mounting tool (100), by means of which the adapter can be fitted to and removed from the contact rail (126). The connector includes a push-cover (20) for the guide sleeve (84), this cover activating a switch in a manner to break the supply of current when the opening of the guide sleeve (84) is accessible to the mounting tool (100). The adapter is provided on the front side (12) thereof with a signal lamp (18), which lights-up when the adapter (10) is connected to a current-carrying conductor.



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An adapter, particularly intended for an electrical contact rail.

The present invention relates to an adapter, and in particular, although not exclusively, to an adapter for an electrical contact rail of the kind set forth in the preamble of Claim 1. As used here, and in the following, the term "contact rail" is meant to include wiring-channels, collector rails and like electrical-conductor devices.

In order to provide a greater degree of flexibility when modifying electrical installation systems, and to reduce costs and save labour, electrical constructional engineers now use to an increasing extent electrical contact rails to which an adapter can be connected directly. A typical contact rail is of U-shaped cross-section, having a slot-like opening facing upwardly or downwardly in the room, through which electrical conductors are drawn. The electrical conductors are embedded on the inner surface of the side walls of the U-shaped section. One such contact rail is described and illustrated in Swedish Lay-Out Print 7106528. The increase in structural flexibility afforded hereby, however, has been achieved at the cost of safety, since the current-carrying conductors lie fully exposed and can readily be touched, thereby presenting a dangerous hazard, not least to children.

In his earlier Swedish Patent Application No. 8206947-7, the proprietor of the present application has proposed a solution to these problems, this solution taking the form of a contact rail which is of substantially C-shaped cross-section and which has inwardly turned ledges which extend towards the mouth of the rail, or conduit, and the inside surfaces of which are intended to support the electrical conductors. This contact rail is arranged to co-act with an adapter which comprises an extendable contact beam, which upon insertion and withdrawal of the adapter is intended to lie flush with an insertion part of said adapter, and which can be extended within the contact rail,

through pivot action, and moved forwards into contact with said conductors and rearwards out of contact therewith, with the aid of suitable means, such as a screw or like device accessible from outside the rail. In this known arrangement, the contact beam is mounted for axial, but not rotational, movement on an axially rotatable shaft having located on the outwardly facing side thereof means, such as a screwdriver slot or like device, by which the shaft can be turned about its long axis. This rotary shaft is tubular and houses a screw by means of which the contact beam can be moved axially on the shaft, into and out of adapter locking positions.

This proposed arrangement for rotating and axially moving the contact beam, or locking beam, between its respective adapter-locking and adapter-releasing positions is encumbered with a number of disadvantages, however. For example, the arrangement is quite complicated, since it comprises two mutually separate parts for effecting rotation and axial movement respectively of the contact beam. Furthermore, the use of a screw to effect axial movement of the contact beam has the serious disadvantage that there are no distinct terminal positions in respect of this movement. Consequently, it is possible to tighten the contact beam to a location which stops short of the conductors, so as to obtain a poor contact and/or so that the adapter is loosely seated. On the other hand, there is a risk that an effort will be made to over-screw the contact bar and thereby damage the screw-threads. Corresponding problems are experienced when screwing-out the contact beam; for example the beam may be screwed out too far, so as to be completely free. Moreover, the screw means is accessible from outside the rail.

Consequently, an object of the invention is to provide an adapter for a contact rail of the aforementioned kind in which a single actuating means is used for both rotating the contact beam and for moving the same axially, and in which this axial movement takes place between two distinct,

readily discernible terminal positions.

To this end the adapter is provided with the features set forth in the characterizing clause of Claim 1.

The invention will now be described in more detail with reference to an exemplifying embodiment thereof illustrated in the accompanying drawings, in which

Figure 1 is a perspective view of an adapter according to the invention;

Figure 2 is a side elevation of an adapter according to the invention;

Figure 3 is an end view of the inventive adapter;

Figure 4 is a perspective view of an adapter in which an extended contact beam occupies its locking position;

Figure 5 is a perspective view of an adapter, illustrating the contact beam in an inserted position, for insertion and withdrawal of the adapter;

Figure 6 is a perspective view of the outwardly facing side of a contact beam;

Figure 7 is a perspective view of the inwardly facing side of a contact beam provided with contact pins;

Figure 8 is a side view of a contact beam;

Figure 9 is an end view of a contact beam;

Figure 10 is an exploded view in perspective of a contact beam, having a phase selector;

Figure 11 illustrates the contact beam shown in Figure 10, seen from the pin side;

Figures 12a, b,c, are three different views of a guide sleeve provided with a curved guide groove:

Figures 13a, b, c are end views of the guide sleeve with corresponding orientation, showing the entry to the guide groove and locking shoulders;

Figures 14a-d are four different views of a pivot shaft intended for co-action with the contact beam and provided with a manouvering sleeve which presents various manouvering and locking slots;

Figure 15 illustrates a tool for mounting the adapter;

Figures 16 a-c are end views of the guide sleeve and the manouvering sleeve, and show the sleeves in three different positions;

Figure 17 is a perspective view of the guide sleeve and manouvering sleeve;

Figure 18 is a cross-sectional view of a contact rail, or wiring channel, with an adapter connected thereto; and

Figure 19 is a partly cut-away detail view of an adapter provided with a so-called safety switch.

Figure 1 illustrates an adapter 10 having a frontal part 12 and a rear part 14, which for reasons of manufacture and assembly may be divided into two parts. Arranged in the frontal part 12 are two earthed, deepened power outlet inserts 16. Also provided in this frontal part of the adapter is an opening for accommodating a signal lamp 18, for example a light diode, which is intended to illuminate when current reaches the adapter. The front of the adapter also has arranged thereon a push cover 20, which simultaneously serves as means for manipulating an adapter switch. The function hereof will be described in more detail hereinafter. The rear part 14 of the adapter includes an insertion part 22 having earthed contact pins 24 positioned asymmetrically thereon.

Figures 2-5 are different views of the adapter 10 and its locking beam or contact beam 26, with said beam being shown in various positions. The insertion part includes recesses 28 which present longitudinally extending ledges 30,31 which receive the contact beam in its inserted position (Figures 2, 3 and 5). As shown in these figures, when the contact beam is inserted, it lies fully within the outer confines of the insertion part. The one ledge 31 is provided with a projection 32, which is intended to determine the position of the contact beam, as described in more detail hereinafter.

The various parts of the locking or contact beam can best be seen from Figures 6-9, which illustrate

different views of the contact beam shown in Figures 2-5. The contact beam comprises a body 34 having a first cover 36 and a second sliding cover 38, which covers a space for accommodating a phase selector. Extending from the phase-conductor space are through-passing slots 40 which are intended to receive phase contact pins 42. Similarly, there is arranged on the opposite short-end of the contact beam a neutral pin 44. When connected to a contact rail, these pins are intended to be in electrical contact with corresponding phase-conductors and neutral conductors respectively. Arranged centrally on the long sides of the contact beam are corresponding conductor-pins 46 and neutral conductor pins 48, which are intended to be brought into contact with corresponding contact lugs or ears associated with respective outgoing conductors in the adapter, when the contact beam is brought to its locking position in a contact rail. Located on the pin side of the contact beam is a screw-threaded cylindrical connector 50 for co-action with a shaft 52, which is shown more clearly in Figure 14.

In Figure 4, the contact beam 26 is shown withdrawn to its fullest extent from the front of the adapter. In this position the beam 26 is in abutment with, or immediately adjacent to the projection 32. At the same time, the contact beam also lies against abutment surfaces 33 on the ledges 30,31. When the adapter is to be locked to a contact rail, the contact beam 26 is moved axially from the position shown in Figure 4 until it rests in cut-outs 29 in the insertion part 22. The contact beam 26 will then lie against flange-like portions on both sides of an opening extending along the contact rail, wherewith neutral pins and phase pins are brought into electrical contact with corresponding phase conductors and neutral conductors arranged in the flange-like portions. Figure 18 illustrates an example of one such contact rail having an adapter connected thereto.

Figures 10 and 11 are exploded views of another

embodiment of a contact beam or locking beam 26'. This beam differs from that aforedescribed insomuch as the body 34' is of different design to the body 34 of the previous embodiment and has a sliding cover 54 which embraces the whole of the body 34', therewith providing a more robust design. Beneath the cover plate 36 there can be seen a contact rail 56, which connects the ingoing neutral contact pin 44 to the outgoing neutral contact pin 48. The ingoing phase contact pin 42 can be placed in any one of the through-passing slots 40, as indicated symbolically at 58. The pin 42 is connected to the outgoing phase contact pin 46 through an insulated conductor 60.

Figures 14 a-d show four different views of the pivot shaft 52, which has a screw-threaded end 62 for connecting the shaft to the connector 50 on the adapter. At its opposite end, the shaft is provided with a hollow shaft-section or cylindrical manouvering sleeve 64 having a complex slot-arrangement 66 arranged therein. This slot arrangement comprises an axial take-out slot 68, a circumferential transverse slot 70, and an axial stop slot 72. In the juncture between the transverse slot 70 and the stop slot 72 there is located a locking position 74, while a release position 76 is located at the opposite end of the stop slot 72, the functions of which will be described more fully hereinafter. The sleeve 64 also has arranged therein two further, substantially axially extending locking slots or grooves 78, 78' having recesses 80, 80' for axially locking the shaft 62 with the contact beam attached thereto. In the figures, the locking slot and associated recess to the left of the slot arrangement 66 have been referenced 78' and 80' respectively. In the figures, the inner surfaces of the sleeve 64 have been identified with a dark colour, while look-through and respective slot sides have been left plain. The slots or grooves 66,78, 78' are approximately uniformly distributed on the end surface 82 of the sleeve 64, and thus have a division of about 120°.

The shaft 52, together with the manouvering sleeve 64, extends in a guide bush or cylindrical channel 84, indicated in broken lines in Figure 2. Figure 12 shows three different side views of the outer wall 86 of the cylindrical channel 84, while Figure 13 shows corresponding end views of the cylindrical channel. Arranged in the cylindrical channel is a guide groove 88 which preferably penetrates the outer wall of said channel. The guide groove is divided into an axial entry section 90, a circumferentially extending removal section 92, an axially extending transport section 94 and a blind release section 96 which also extends circumferentially but in the opposite direction. A release location 98 is provided at the blind end of the release section 96 of the groove or channel 88.

Figure 15 illustrates an adapter-mounting tool 100 comprising a stem 102, a manouvering projection 104 and a handle 106. The stem 102 is suitably cylindrical and has a diameter which enables it to fit exactly in the manouvering sleeve 64 of the shaft 52. When connecting the adapter to a contact rail, or removing the adapter therefrom, the tool 100 is inserted into the sleeve 64 in a manner such that the projection 104 extends through the manouvering groove 66 and out into the guide groove or channel 88.

The working function of the adapter will now be explained by describing the sequence of events taking place when mounting the adapter onto a contact rail and removing the adapter therefrom. In a starting position, the contact beam 26 is located parallel with the insertion part 22 in the recesses 28. The projection 104 is located in the release position 26 of the lock slot and in the release position 98 of the guide slot. The adapter can now be removed from or inserted into the opening presented by the contact rail. When wishing to lock the adapter, the handle is turned through approximately 90°, whereupon the projection 104 will be located at the lower end of the

transport section 94 of the guide slot or groove. The locking shoulders 99 are now located axially outside the entrance to the locking grooves 78, 78'. The locking beam, or contact beam, 26 is located at right angles to the longitudinal direction of the insertion part 22, immediately beneath the projection 32. The handle is now pulled axially outwards, so that the projection 104 is moved along the whole of the transport section 94 of the guide groove. Initially, the projection moves in the stop slot 72 of the manouvering slot arrangement, from the release position 76 to the lock position 74, the projection drawing therewith the shaft 52 and the contact or locking beam 26. When the projection has reached the upper position of the transport section, the beam 26 is in abutment with the flange-like portions of the contact rail, wherewith the various contact pins are brought into contact with respective conductors in the contact rail. The handle can now be turned in the opposite direction, whereupon the projection 104 first moves in the removal section 92 and the transverse slot 70, up to the take-out slot 68, without anything happening. Upon continued rotation of the handle, the manouvering sleeve 64 and the shaft 52 will accompany the rotation. The beam 26, however, is unable to accompany this rotation, since it is fixed by the notch or cut-out 29. Instead, the screw-threaded part 62 of the shaft will move in relation to the connector 50. Upon rotation of the manouvering sleeve 64, the locking shoulders 99 will be moved into the recesses 80,80'. The manouvering sleeve 64, and therewith the shaft 52 and the locking or contact beam 26, is therewith held axially. It is now possible to withdraw the tool from the manouvering sleeve 64 and the cylindrical passage 84, whereupon the projection 104 passes out through the entry section 90 of the guide groove 88.

The reverse procedure is taken when wishing to remove the adapter from the contact rail, as hereinbefore defined. The tool 100 is moved into the cylindrical channel

84, whereupon the projection 104 follows the entry section 90 of the guide groove or slot 88. Simultaneously, the projection is moved to the bottom of the take-out groove 88 of the operating groove or slot arrangement 66. When the projection has reached the bottoms of respective groove sections, the tool is rotated, whereupon the projection follows the removal section 92 of the guide groove, to the other end of said section. During the initial stages of this movement, the projection moves along the transverse groove 70 of the groove arrangement 66 up to the locking position 74, and begins therewith to turn the manouvering sleeve 64, and therewith the shaft 52. The locking shoulders 99 are therewith brought out of engagement with the recesses 80,80' and therewith no longer prevent axial movement. At the same time, the screw-threaded part of the shaft is rotated in relation to the cylindrical connector 50 of the locking or contact beam 26. The projection 104 is now moved along the transport section 94 to the bottom thereof. At the same time, the projection is moved from the locking position 74 of the stop groove 72, to the release position 76 and thereafter dogs the shaft 52 with the locking beam 26 connected thereto. The beam 26 is now free and out of engagement with the electrical conductors located on the flange-like portions of the contact rail, and accompanies rotation of the projection 104 along the release section 96 of the guide groove arrangement, up to the release position 98. The beam 26 has now been swung into the recesses 28 in the insertion part 22. The adapter can now be withdrawn from the contact rail.

As will be evident from the aforegoing, it is only possible to remove the tool 100 from the adapter when the beam 26 is located in its withdrawn and its inserted position. This means that the tool can only be withdrawn from an adapter inserted into a contact rail when the adapter is locked thereto with the aid of the locking beam 26 in the flange-like portions of the contact rail and in contact with the electrical conductors carried thereby. This provides a guarantee that installation of the adapter is

always accomplished and not left incomplete.

The locking or contact beam 26, together with the shaft 52, is mounted on the adapter 10 in the following manner. The shaft 52 is screwed down to the prescribed depth in the cylindrical connector 50 on the beam 26. The mounting tool is inserted into the channel 84, so that the projection 104 is located in an intermediate position along the release section 96 of the guide-groove arrangement. The manouvering sleeve 64 is now moved into the cylindrical channel, so that the projection is located in the manouvering groove 66. The sleeve is then moved further so that the projection moves along the whole length of the manouvering groove, up to the release sections 96. The handle is now turned to move the beam 26 to its extended position. The beam is now located beneath the projection 32. If this is not so, or if the distance is too great, the beam is removed from the adapter and the shaft 52 rotated to adjust the same axially.

The push cover 20 illustrated in Figure 1, has a hole 108 for accommodating the tool 100. The cover 20 operates a conventional switch, not shown. In this respect, the hole 108 is located centrally of the cylindrical channel 84 when the current is switched off. Thus, it is only possible to insert the tool when the current is broken. Similarly, it is not possible to connect a current- consuming load to the adapter and to take current therefrom before the locking and contact beam is brought to its locking and contact position. This constitutes an additional safety feature of the invention preventing, inter alia, the occurrence of arcing when connecting and disconnecting.

Figures 16 a-c are endviews of the guide sleeve 84 and the manouvering sleeve 64 in different relative positions, and also illustrate the stem 102 of the mounting tool 100. In Figure 16a, the projection 104 is located in the axial stop groove of the guide groove arrangement, the beam 26 being extended. The manouvering sleeve and the locking beam can have any axial position whatsoever between their terminal positions, inclusive of said positions. In

Figure 16b, the manouvering sleeve occupies its upper position, the locking shoulders 99 being engaged in the recesses 80,80' in the lock grooves 78, 78'. The take-out groove 68 of the manouvering groove 66 is located opposite the entry section 90 of the guide groove 88, and the mounting tool is removed. In Figure 16 c, the projection 104 is located in the release position 98 in the blind terminal part of the release section 96 of said guide groove. The locking shoulders 99 are now freely located above the end plane of the manouvering sleeve 64.

Figure 17 illustrates a part of the guide sleeve 84 incorporating the guide groove arrangement 88. The position of the manouvering groove 66 of the shaft 52 is illustrated in broken lines. The shaft and the contact beam (not shown) are under transportation in a direction away from the frontal part 12 of the device and the locking position of the contact beam, which will be evident from the fact that the manouvering projection 104 of the tool 100 is located far down in the release position 76 of the stop groove 72.

Figure 18 illustrates an adapter according to the invention mounted on a preferred embodiment of a contact rail, together with associated components. Thus, the contact rail 126 comprises a hollow, preferably C-shaped strip-like body 128, preferably having a standing or lying, slightly elongated rectangular profile, in which one long side forms a rear wall 130 having connected thereto short sides 132 which merge with frontal sides 134 which, at a distance from one another, are folded rearwardly in a direction towards the rear wall 130 to form sides 136 defining an elongated opening 138. The free edges of the opening-defining sides 136 slope in towards hook-profiles 140 which face the short sides 132 and which are corresponded centrally on the inside of respective short sides of a hook-profile 142.

The thus formed body defines a cavity 144 and includes mounting profiles 146 which preferably project outwardly from the outer extremities of the rear wall 130

and which are suitably used for mounting the contact rail to the wall of a room, while located between the mounting profiles 146 are additional mounting profiles 148 and 150 for use when mounting the contact rail to the ceiling. All of the mounting profiles are suitably arranged in pairs with oppositely directed flanges for attaching the rail to conventional bracket structures or the like.

One of the inner mounting profiles 148 is preferably hollow and provided with a groove 152 which is open towards the cavity 144 and is provided with hooked-profiles at the mouth thereof for holding an earthed conductor 154, which suitably has the form of a generally U-shaped clamping strip having convex, inwardly bent leg elements which ensure positive contact through their inherent springiness.

The spaces between respective hook profiles 140, opening-defining sides 136, front sides 134, short sides 132 and hook profiles 142 each have arranged therein an electrically insulating strip 156, for example a suitable plastics material having given elastic properties. Each strip has a base which lies against respective front sides 134 and from which there extends towards the central regions of the cavity 144 pairs of lips, each of which pair encloses a channel for accommodating phase conductors 158,159 and a neutral conductor 160 respectively. These conductors suitably have the same or similar form as the earth conductor 154. The outmost lips of each insulating strip are provided with shoulders which snap-in behind the hook profiles 140 and 142, so as to be firmly attached thereto. The lips have curved free ends which abut each other resiliently in pairs, there being formed from the cavity 144 a wedge-shaped entrance which does not normally communicate with the channels enclosed by the lips, and therewith the conductors. Thus, the conductors are so covered and guarded as to prevent them from being touched or coming into contact with water droplets, e.g. condensation. The lips will remain in their closed position, held by the inherent elasticity of said lips, until the aforedescribed contacts 42,44 are

pushed in between said lips, so as to come into contact with the conductors intended.

The figure illustrates how the locking or contact beam 26 is pressed against the flange-like portion of the rail lying on both sides of the longitudinally extending opening 138, primarily abutting the insulating strips 156. In this way, the neutral conductor pin 44 and the phase conductor pin 42 engage respective corresponding conductors in the insulating strips 156. The contact beam illustrated in Figure 1 is marked to show the different phase positions L1-L5 and 0. L1-L3 and 0 relates to the phases in the general three-phase mains network, while L4 and L5 are reserve conductors which can be used for a further current supply system, a control circuit or the like. When using a large number of current outlets on the contact beam, it is difficult to connect all outlets directly to the adapter 10 solely with the aid of the illustrated pins 46, 48. In this case, a cable connection can be arranged between the connecting pins on the contact beam and the adapter.

The usefulness of a contact rail and an adapter according to the present invention is not restricted to the transmission of power, but can also be used for conveying electrical signals, for example in telecommunication systems or data network systems. To this end, telecommunication lines or a data-bus line can be arranged, for example, in a groove adjacent the earthed-contact conductor groove 152 or on the places for the phase conductors 159, corresponding to the phases L4 and L5. The contact between conductors and the adapter can, also in this case, be effected with the aid of contact pins. Particularly in the case of a data-bus, an adapter can be arranged at a suitable location along the data-bus line, which is connected to a corresponding contact means on the adapter or the contact beam associated therewith. In the case of an adapter intended for telecommunication systems or datacommunication systems or the like, it is not always necessary to provide a power outlet, and in such cases the neutral conductor pin 44 and phase pin 46

are omitted from the contact beam 26. When the communication line is arranged in a groove in the back wall 130 of the contact rail, the locking or contact beam may be completely devoid of contact pins, and will then solely serve as a locking beam.

The size of the contact rail is dependent upon prevailing requirements, and the rail may be provided with a larger or smaller number of grooves for accommodating different power supply lines, telecommunications lines and datacommunication lines. The contact rail and associated contact beam can then be asymmetrically designed.

When forming the manouvering groove 66 and the guide groove 88, it must be ensured that the length of the removal section 92 of the groove 66 is at least equally as long as the guide groove 70 plus the locking recesses 80,80', so that it is possible to rotate the projection 104 of the tool 100 from the transport section 94 of the guide groove to the removal section 90, prior to movement being arrested by the locking shoulders 99.

As will be understood, the shaft 52 may be connected to the locking beam 26 by means other than the screw connection 50,62. For example, the shaft may be provided with a groove in which there is seated a locking ring which is inserted into a slot in the beam 26, so as to hold the shaft thereto. In this case, it should be seen that the friction between the locking ring and the slot walls is such that the beam 26 will positively accompany the rotary movement of the shaft.

The release section of the guide groove shall include an angle which is at least equal to the angle between the abutment surfaces 30,31 and the abutment surfaces 33. If the angle of the release section is greater, the screw-threaded part 62 of the shaft 52, or like connecting means, will rotate in relation to the cylindrical connector 50 when the locking beam 26 comes into abutment with the aforesaid abutment surfaces.

The number of manouvering grooves 66 and corresponding

number of guide grooves 88 is not critical to the invention. Similarly, there may be provided one or more locking grooves 80,80' and a corresponding number of locking shoulders. Preferably, the locking grooves and manouvering grooves are distributed around the periphery of the manouvering sleeve in a manner which makes it impossible to wrongly mount the adapter. This can be effected by making either the locking shoulders 99 or the projection 104 so large that they will only enter their respective grooves and no other. The various grooves in the manouvering sleeve 64 and the locking shoulders and the guide groove or guide grooves 88 respectively may also be asymmetrically distributed, so that it is impossible to wrongly insert the locking shoulders and/or the mounting tool in the wrong groove.

The signal lamp 18 is connected so that it lights up when the adapter is connected. In this respect, it may be arranged to illuminate either when the pins of the contact beam 26 come into contact with the conductors of the contact rail, or when current is supplied to the outlet insert 16, by activating the switch through the push cover 20.

Because the locking beam 26 abuts primarily the elastic insulating strips 156, which have a certain degree of resilience, the adapter is held firmly in the absence of any play, while eliminating the risk of damaging the contact rail or adapter due to insufficient clearance when fitting the adapter or upon axial displacement in the screw-thread connection (50,62) when locking the beam 26 by means of the shaft 52 and the locking shoulder 80. The invention is not restricted to the described and illustrated embodiment, and modifications can be carried out thereto within the scope of the invention as defined in the following claims. For example, the guide groove and manouvering groove need not necessarily extend axially and in the peripheral direction at right angles to the axis line, but may also have other forms, provided that the projection on the mounting tool is

able to move the locking or contact beam from an inserted position parallel with the longitudinal direction of the insertion part 22 to an extended position in which it abuts the flange-like portions of the contact rail, wherewith contact pins on the beam are in conducting contact with the conductors of the contact rail.

The switch on the adapter may suitably be a so-called "safety switch". Figure 19 illustrates such a safety switch 110, which is fitted into an opening 114 in the front part 12 of the adapter. The switch is provided with a switch member 112 which extends into an arrester recess 115 arranged in the push cover 20. The automatic switch is connected to pin sleeves 116, 117 for incoming neutral conductors and phase conductors, by means of connector pins 118,119. The walls 120, 122 defining the arrester recess are arranged to activate the switch member when the cover is moved between "ON" and "OFF" positions. Correspondingly, the switch member 112 moves the push cover 20 from the "ON" to the "OFF" position when the switch is broken and the current broken. The "ON" or "OFF" position of the cover may optionally be marked with a colour indicator beneath the cover, or in some other way.

In the figure, the switch 110 and the cover 20 are shown in the "OFF" position, the opening 108 of the cover being located opposite the mouth of the guide sleeve 84. The "ON" position of the cover 20 and the switch 110 is shown in broken lines 20', 112' respectively. In this position, the hole 108 of the cover 20 is located to one side of the opening 108, thereby enabling the stem of the tool 100 to be inserted into the guide sleeve. Thus, the adapter is locked against removal when a consumer load is connected and current is being taken out.

The push cover 20 is used in the following manner when fitting an adapter to a contact rail and removing the adapter therefrom.

Subsequent to mounting the adapter in the afore-described manner and removing the tool 100 from the adapter,

the cover is pushed over to the "ON" position 20'. This activates the automatic fuse 110, whereupon the adapter outputs conduct current. The hole 108 of the cover has now been moved to one side of the mouth of the guide sleeve 84, and the tool 100 can no longer be inserted into the guide sleeve.

In order to remove the guide sleeve, it is first necessary to move the cover to the "OFF" position 20. In this position no current passes to the adapter and it is possible to insert the tool through the hole 108 in the sleeve 84.

The adapter is not restricted to a single signal lamp or other signal device, but may be provided with a plurality of such lamps or devices capable of providing information concerning the adapter and a consumer load connected thereto, for example relating to possible malfunctions and indicating the phase to which the adapter is connected.

When using the connector arrangement according to the invention, the shaft 52 may be provided with one or more external, radial locking shoulders corresponding to the shoulders 99.

These locking shoulders are then arranged to co-act with locking grooves provided in the end of the sleeve 84 facing the locking beam, and provided with recesses for receiving the locking shoulders. These locking grooves and locking shoulders have a corresponding functional mode to all the corresponding parts described with reference to the drawings.

The special design of section 92 as shown in figures 12 and 17 is provided to safeguard the contact pins penetration of the lips of said insulating strip and entrance into the phase conductors, which all constitute a certain initial resistance.

Fig. 20 shows a sectional view of a contact beam and pivot shaft according to a modified embodiment of the invention in contact position.

Fig. 21 shows a similar view of the same arrangement, but in none-contact position.

Fig. 22 and 23 are cross sectional views along section lines A-A in Fig. 22 and B-B in Fig. 23 respectively.

As an alternative to screwing the pivot shaft into the contact and locking beam, the latter may be equipped with a tube-like connector extending into the insertion part and housing a recessed bore, into which said pivot shaft can be inserted from the rear side of the beam. The shaft fits into said bore and its rear end is stopped by a circumferential flange, the diameter of which is larger than the recessed part of said bore (Fig. 20). The unrecessed (rear) part of said bore is furnished with preferably two locking ribs extending in axial direction at opposite sides into the larger bore part. Said flange is provided in a corresponding way with two notches, which can slide over and along these ribs as shown in Fig.s. 20-23. Normally, the pivot shaft is engaged with said ribs via its flange and notches (Fig. 21). But in the extended beam position just before pulling out the tool, the latter has to be turned slightly as hereinbefore described, and this slight turning is performed according to this embodiment in a position according to Fig. 20, where pivot shaft and beam are not interlocking each other, so that no relative movements occurs which, of course, is advantageous. Furthermore, such an embodiment allows rapid assemblance and disassemblance.

CLAIMS

1. An adapter, particularly intended for a contact rail for distributing electrical current and/or telecommunication or control communication signals, said rail being substantially of C-shaped cross-section and presenting a through passing opening (138), into which an insertion part (22) of the adapter carrying a contact and locking beam (26) can be inserted at any selected location therealong, in which said beam for the purpose of mounting and removing the adapter can be swung to an inserted position in which it lies parallel with said insertion part (22), and which for the purpose of locking the adapter and bringing the same into electrical contact with conductors (158, 159,160) located behind the front side surfaces (134) of the C-profile is arranged to be withdrawn by pivoting said locking and contact bar through preferably 90° relative to the insertion part (22) and drawn towards said front side surfaces (134), said pivoting movement being arranged to be effected by a suitable tool (100) via a pivot shaft (52) carried by the beam, c h a r a c t e r i z e d in that the shaft (52) is mounted in a guide sleeve (84) which is permanently mounted on the adapter (10) and which presents a guide-groove arrangement (88) arranged for co-action with said tool (100) , and at least one inwardly projecting locking shoulder (99) or at least one locking groove (78); in that the guide groove extends from the front side (12) of the adapter somewhat into the adapter, at least in the axial direction (90), to then depart (at 92) through a short distance at least substantially in the peripheral direction of the sleeve, and thereafter to extend substantially axially (94) away from said front side, and finally departs (at 96) substantially peripherally in either direction; in that the end of the shaft remote from the contact beam is hollow and is intended to receive a stem (102) of said tool and a radially outwardly projecting manouvering projection (104) arranged on said stem; and in that the part (64) of

the shaft co-acting with said tool is provided with a manouvering groove (66) which extends at least substantially axially (68) from the front side of the guide sleeve and then through a distance at least substantially in the peripheral direction (70), and at least one similar locking groove (78,78') and at least one locking shoulder (99) respectively, the locking groove being arranged to receive said locking shoulder, while said guide groove (88) and said manouvering groove (66) are arranged to accommodate the aforesaid manouvering projection (104).

2. An adapter according to Claim 1, characterized in that the manouvering groove (66) is terminated by a groove part (72) which extends axially from the front side of the adapter.

3. An adapter according to Claim 1 or Claim 2, characterized in that the part (68) of the manouvering groove (66) extending from the front side of the adapter extends peripherally (70) in the same direction as the recesses (80,80') for the locking shoulder (99) from associated locking grooves (78,78').

4. An adapter according to any one of Claims 1-3, characterized in that the second departure point (96) of the guide groove (88) extends in the same direction as the first departure (92).

5. An adapter according to any one of Claims 1-4, characterized in that the first departure (92) of the guide groove (88) is at least substantially equal in length to the sum of the extension of the manouvering groove in the peripheral direction (70) and the recesses (80,80') of the locking groove (78,78').

6. An adapter according to any one of Claims 1-5, characterized by a slidable cover (20) which is arranged on the front (12) of the adapter (10) and which activates a known switch, preferably an automatic safety switch, for co-action with departing current-carrying conductors of the adapter; in that the cover (20) has arranged therein a hole (108) for receiving the tool (100); in that the hole

is located opposite the mouth of the guide sleeve (86) when the current is broken, while said mouth is covered by said cover when the current is on and/or in that the adapter incorporates a signal lamp (18) which lights up when the adapter is connected to a current-carrying conductor.

7. An adapter according to any one of Claims 1-6, characterized in that the shaft (52) is screwed into the contact beam (26) or axially fixed therein and is restrictively rotatable with the aid of said tool relative to said beam while overcoming a given frictional force, preferably with the projection (104) of said tool located within the peripherally extending transition regions (92) between the tool axial guide grooves (90,94) and the corresponding depth (extension in the peripheral direction) of the recesses (80,80') of the locking grooves (78,78').

8. An adapter according to any one of Claims 1-7, characterized in that the distance between a projection (32) located on the insertion part (22), said projection constituting a limitation for axial movement of the contact beam (26) from the front (12) of the adapter, and the bottom of a cut-out (29) in which the contact beam rests in the locked position, substantially corresponds to the sum of the axial extension ot the contact beam and the length of the second axial part of the guide groove.

9. In an adapter according to any one of Claims 1-8, a method for mounting a contact and locking beam (26) and pivot shaft (52) in the adapter (10), characterized by mounting or screwing, the shaft to a given depth in the contact beam (26); inserting the mounting tool (100) into the guide sleeve (84) so that the manouvering projection (104) is located in the second departure or transition region of the guide groove (88), preferably at a distance from the axial part (94) of said guide groove; inserting the shaft (52) into the guide sleeve (84), so that the projection (104) of the mounting tool fits into the manouvering groove (66) and is moved along the length of the manouvering groove while executing axial and rotational

movements, whereupon the projection of said tool is finally turned to one of its terminal positions (98) and and the cut-out (94 and 96 respectively) and the contact beam (26) is turned to a corresponding position parallel with and at right angles to the long sides of the insertion part (22), it being ensured that the contact beam takes the correct axial position, for example with the aid of a position-determining projection (32).

10. In an adapter according to any one of Claims 1-8, A method for removing the adapter from or mounting said adapter to a current rail or the like (126), characterized by, for the purpose of removing the adapter, inserting the mounting tool (100) into the guide sleeve (84) and the hollow section (64) of the shaft, said projection (104) passing through the first axial part (90) of the guide groove (88) and the axial groove part (68) of the manouvering groove (66), whereupon the tool is rotated, the projection of said tool following the first departure or transit section of the guide groove and therewith first passes the peripherally extending groove part (70) of the manouvering groove to the opposite end of said groove part, and then dogs the shaft (52) so that the locking shoulders (99) are released from the recess (80), whereupon the projection (104) is moved along the second axial part (94) of the guide groove and therewith dogs the shaft (52) and moves the contact beam (26) out of engagement with the contact rail (126) and out of the recess or like cut-out (29) of the adapter, and finally moves the projection (104) along the second peripherally extending part (96) of the guide groove, the shaft (52) being rotated and the contact beam (26) swung by the shaft (52) into recesses (28) in the insertion part (22) of the adapter, whereupon the contact bar (26) can be drawn out through the opening (138) of the contact rail, and conversely, when mounting the adapter (10) onto a contact rail (26), the contact and locking beam of the adapter is first swung into the recess section (28) with the aid of the mounting tool (100), whereupon the

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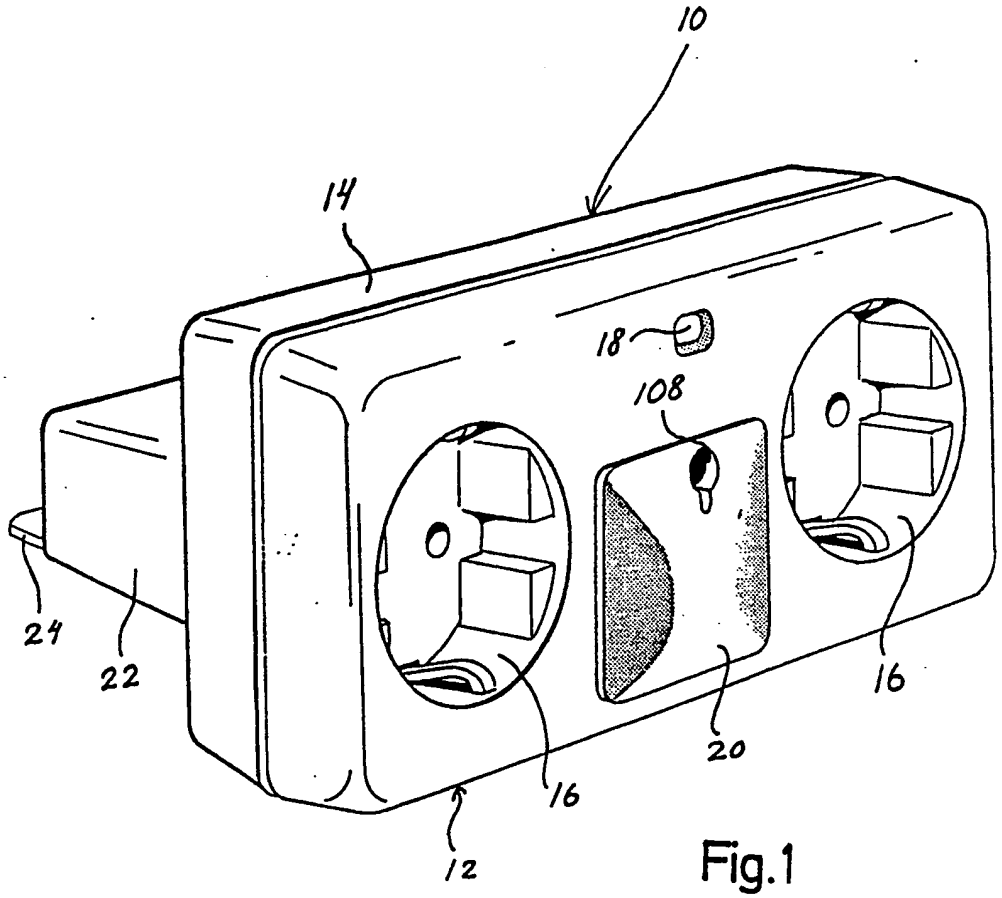


Fig.1

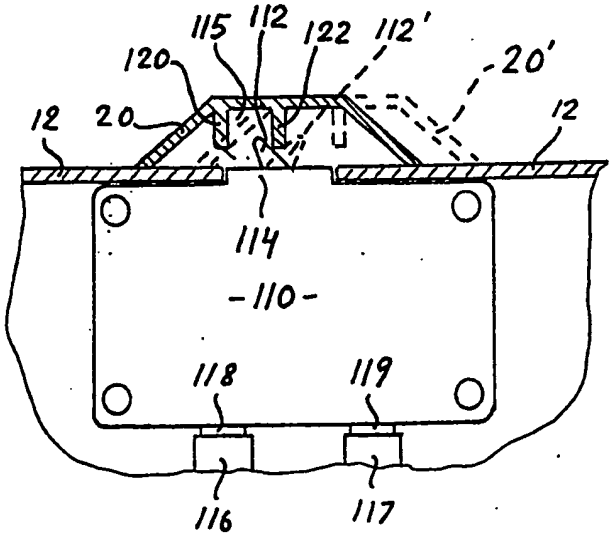


Fig.19

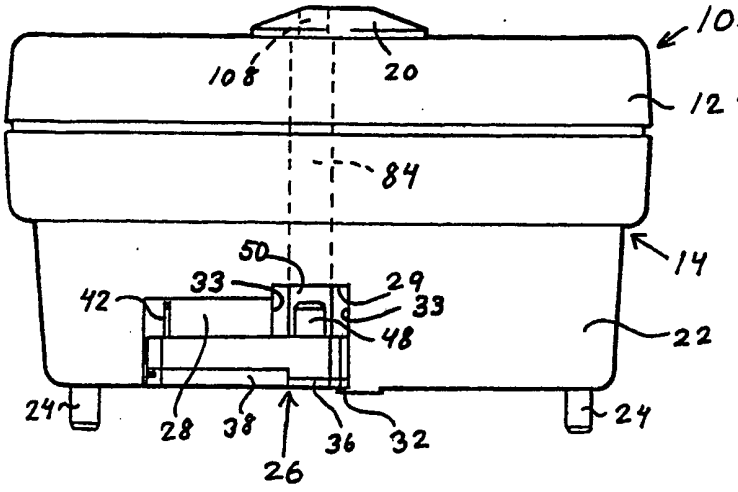


Fig.2

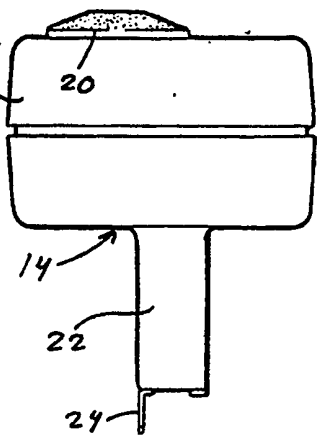


Fig.3

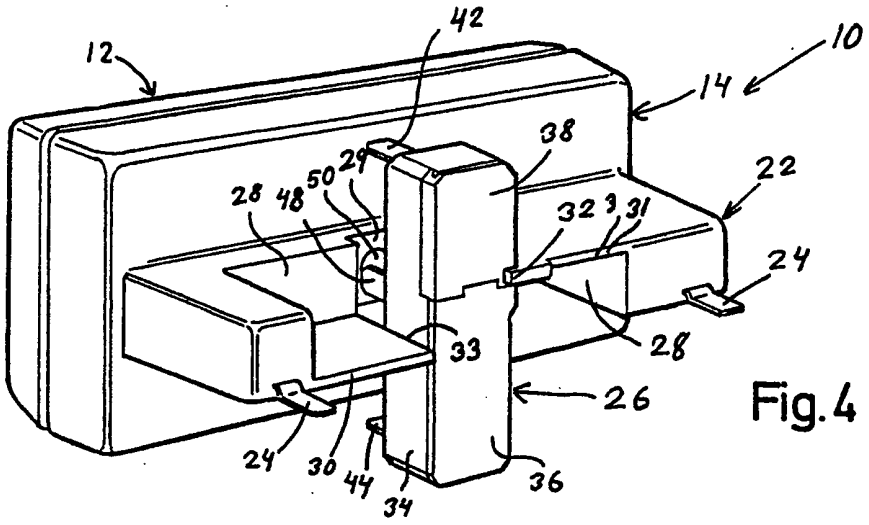


Fig.4

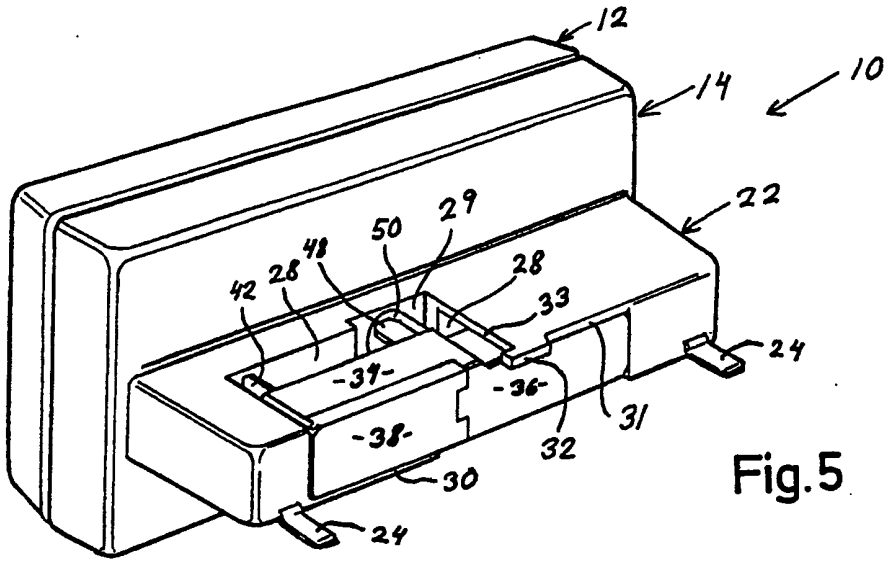


Fig.5

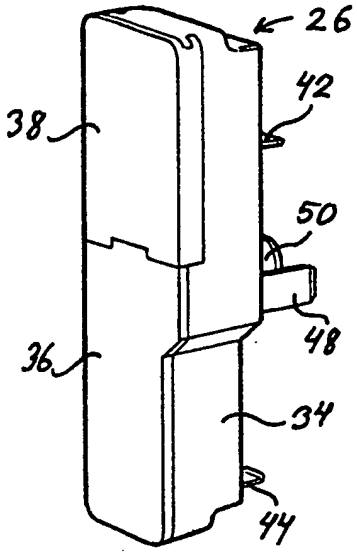


Fig. 6

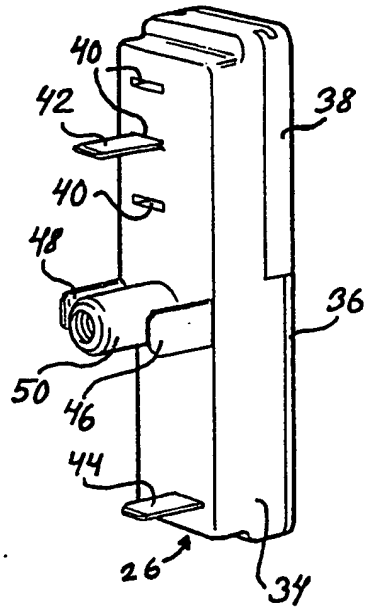


Fig. 7

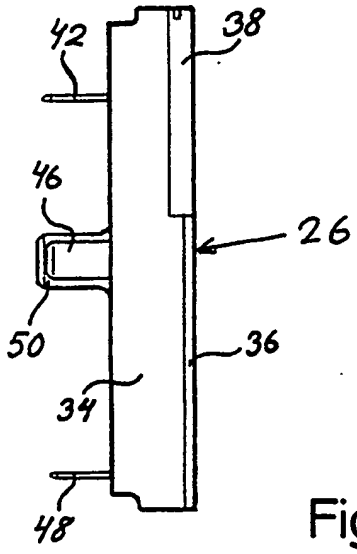


Fig. 8

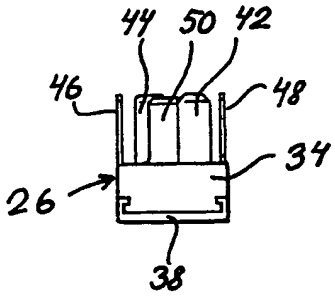


Fig. 9

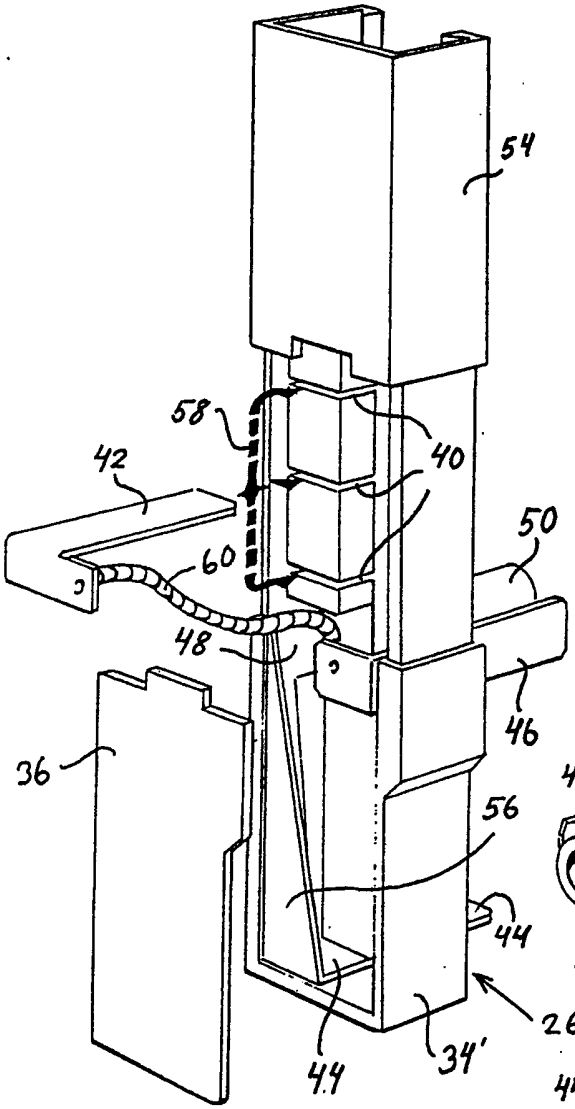


Fig. 10

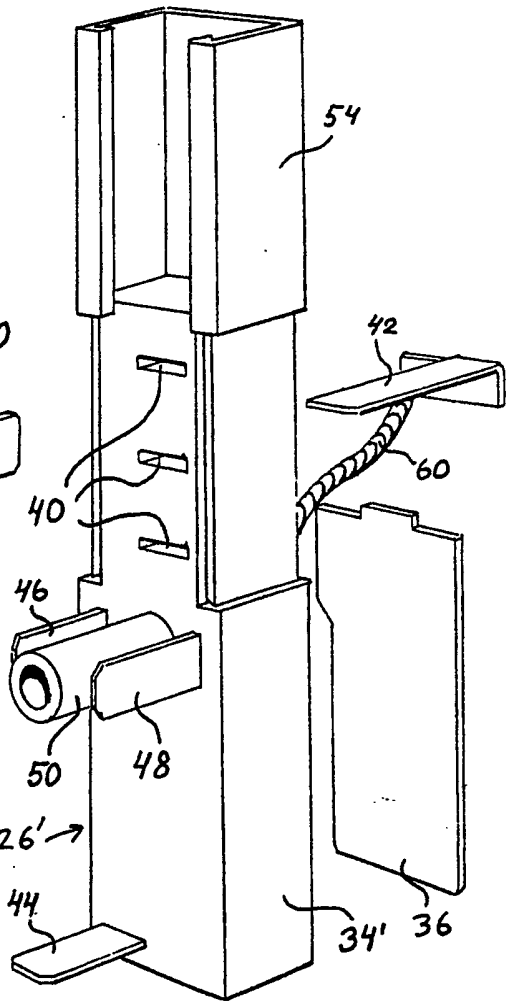


Fig. 11

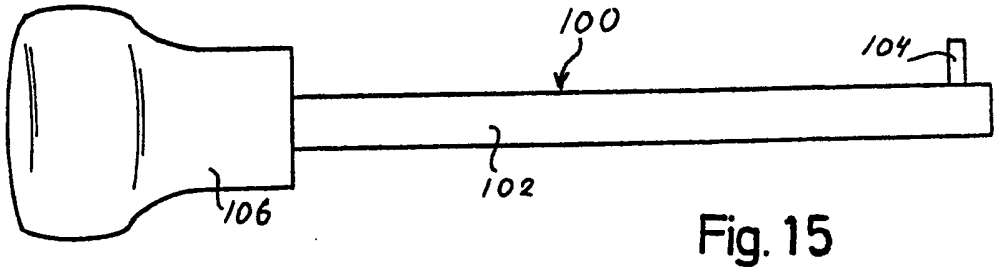


Fig. 15

Fig.12

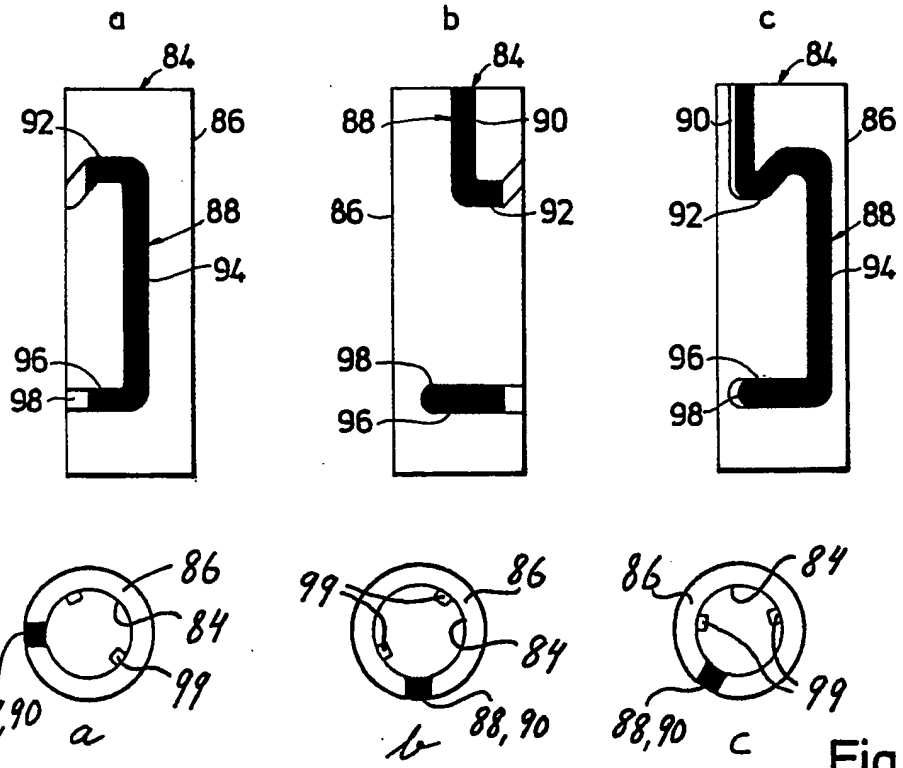


Fig. 13

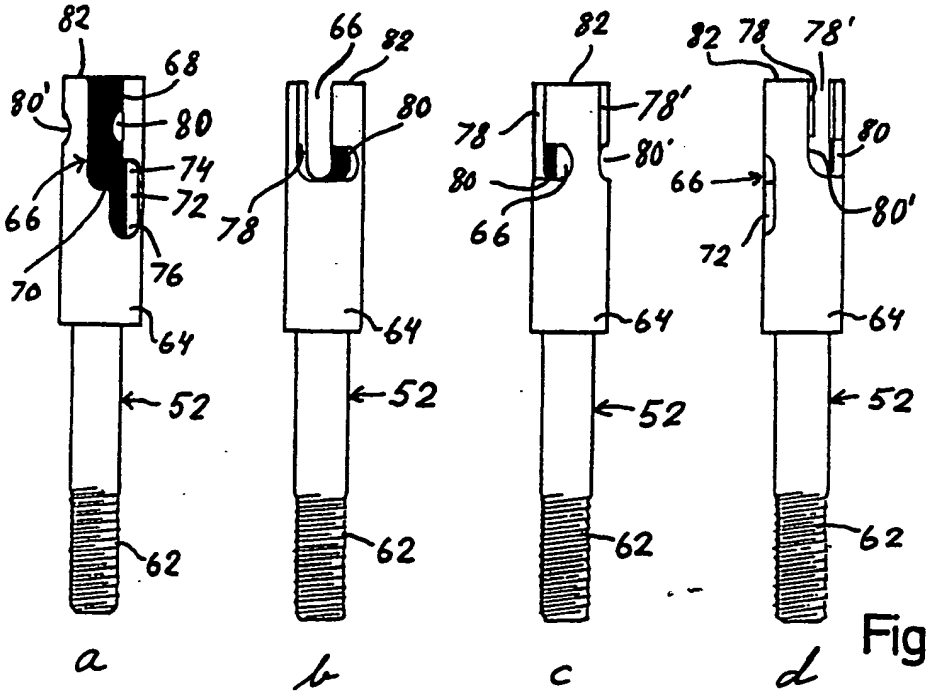
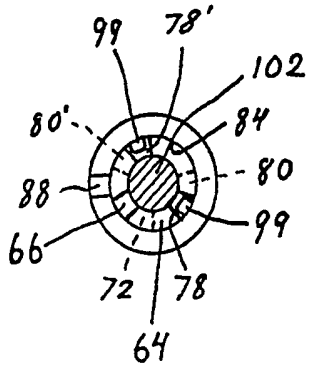
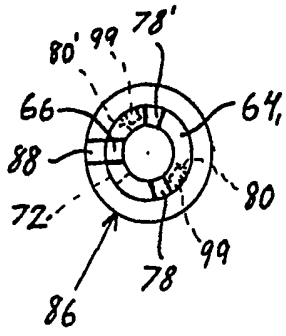


Fig.14

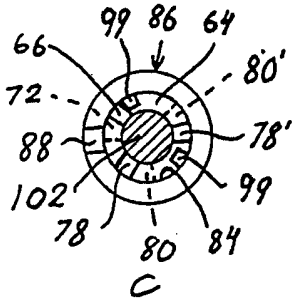
Fig.17



a

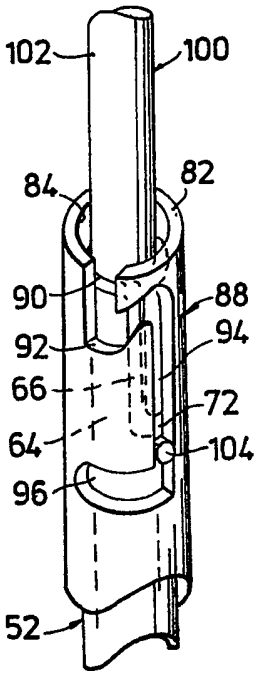


b



c

Fig.16



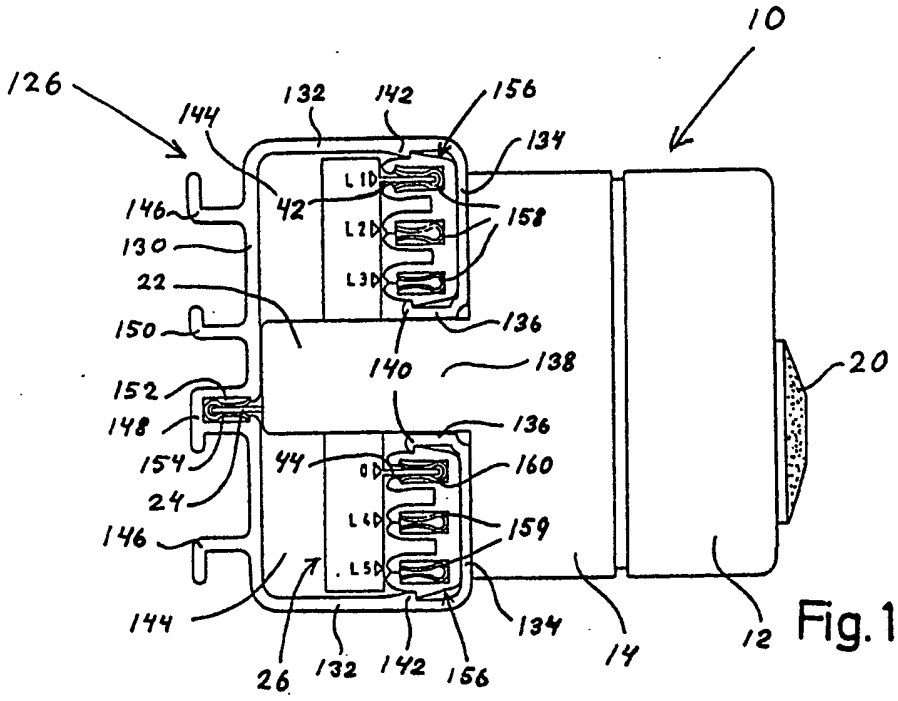


Fig.18

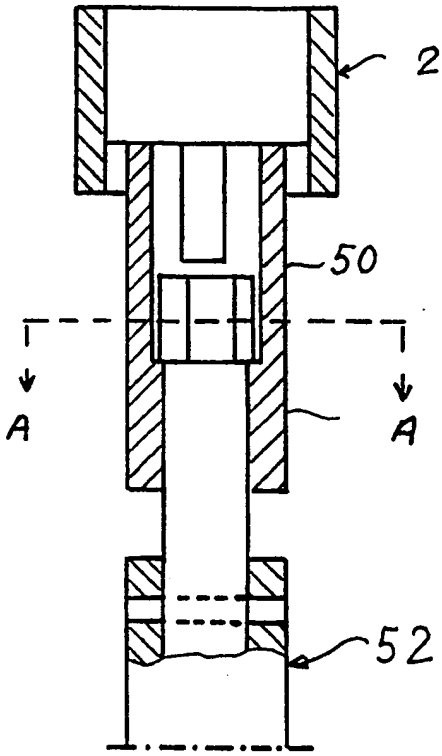


FIG. 20

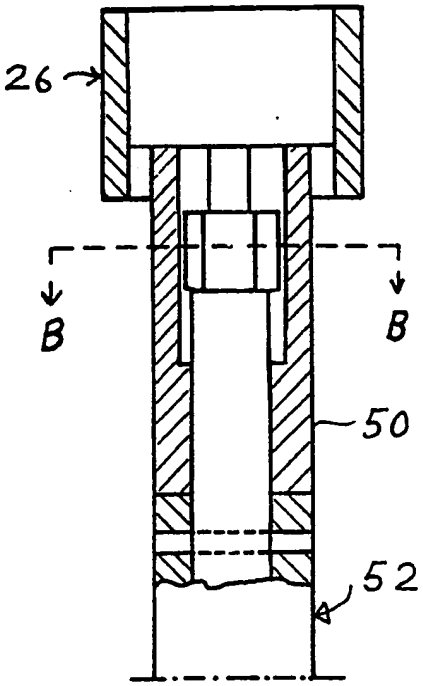
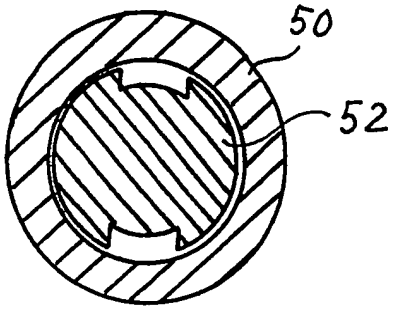
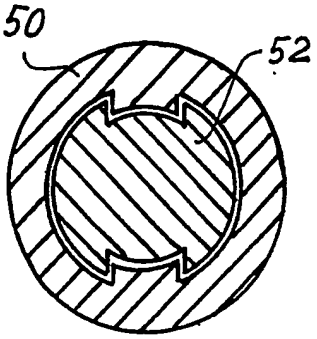


FIG. 21



A - A

FIG. 22



B - B

FIG. 23